

## CLAIMS

We claim:

1. A semiconductor device comprising:
  - a substrate suitable for use in electronic and integrated circuits;
  - a layer of refractory polycrystalline material formed on at least a portion of the substrate; and
  - a layer of polycrystalline silicon formed on the refractory layer.
2. The semiconductor device according to claim 1, wherein said device is a thin film transistor (TFT) suitable for applications selected from the group consisting of liquid crystal displays (LCDs) and light emitting diodes (LEDs).
3. The semiconductor device according to claim 1, wherein the substrate is glass, glass-ceramic, ceramic, metal or plastic.
4. The semiconductor device according to claim 1, wherein the refractory material is selected from the group consisting of Al, Mg, Ti, Zr, Y, Ca, Mo, Ce, Hf, Ta, B, V and a combination of these.
5. The semiconductor device according to claim 4, wherein the refractory material is characterized by having low thermal conductivity and high electrical permittivity.
6. The semiconductor device according to claim 4, wherein the refractory material is polycrystalline zirconia.
7. The semiconductor device according to claim 4, wherein the refractory material is an oxide.
8. The semiconductor device according to claim 4, wherein said refractory material is a carbide, nitride or boride.

9. The semiconductor device according to claim 4, wherein said refractory material contains silicon.
10. The semiconductor device according to claim 4, wherein said refractory material is porous.
11. A refractory material layer according to claims 4 to 10, wherein said material is deposited by sol-gel technique or anodic oxidation.
12. The refractory material layer according to claims 4 to 10, wherein said refractory material is deposited by chemical or physical vapor deposition processes.
13. The refractory material layer according to claims 4 to 10, wherein said refractory material is deposited by electron, ion, atom or laser beam processes.
14. The refractory material according to claims 4 to 10, wherein said refractory material has at least one crystal parameter close to that of crystalline silicon
15. A process for making a semiconductor device according to claim 1, in which silicon is deposited by either chemical vapor deposition methods or physical vapor deposition methods.
16. The process according to claim 15, wherein silicon is crystallized using laser annealing techniques
17. The process according to claim 16, wherein silicon is annealed using an excimer laser
18. The process according to claim 16, wherein silicon is crystallized by either microwave annealing, furnace annealing or lamp annealing.

19. The semiconductor device according to claim 1, wherein said device is a PIN diode suitable for applications selected from the group consisting of imaging sensors and photovoltaic devices.